

A note on the phenology of **Platypalpus** Macquart  
(Diptera : Empidoidea, Hybotidae)  
in Belgium using Malaise traps\*

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**Summary**

A large number of *Platypalpus* was collected with Malaise traps at three localities in Belgium. A high diversity of species is found in each locality but the flight periods of the dominant species are separated in time.

**Résumé**

De nombreux *Platypalpus* ont été récoltés avec des pièges Malaises dans trois localités de Belgique pendant une année. On a relevé une grande diversité : plus de 30 espèces par localité. Les périodes de vol des espèces dominantes sont séparées dans le temps.

The genus *Platypalpus* includes small predacious flies. About 80 species are actually known from Belgium. This high number of species indicates that either a habitat or a niche segregation exists in the genus *Platypalpus*. A preliminary zoogeographical study, based mainly on museum collections (Grootaert, 1981), revealed very few data about their distribution in Belgium. A few species are restricted to the coast but no other relevant data could be drawn due to the low number of records. Museum collections comprise predominantly species collected incidentally by sweeping at a certain locality on a single date ; consequently phenological data are vague, leading to conclusions as present from April to October, but no information is obtained about peaks of activity.

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Studies on *Platypalpus* are generally limited to taxonomy. Recently, Bährmann (1984) obtained data on dominance, diversity, phenology, habitat and sex-ratio by semi-quantitative sweeping. The main purpose of the present study is to examine whether *Platypalpus* species are separated in time of occurrence and what kind of flight periods they exhibit. The activity of *Platypalpus* was followed throughout 1981 at three localities: Sint-Martens-Latem (low Belgium), Ottignies (mid Belgium; 1981 and 1982) and Ethe-Buzenol (high Belgium).

#### Material and methods

The Malaise traps used are white and have a single trapezoid vertical wall (2.5 m at top; 1 m at lowest point and 3 m long) covered by a gently sloping roof. The flies were collected in alcohol.

Sint-Martens-Latem (low Belgium, alt. 8 m, prov. Oost-Vlaanderen). The trap was placed in a garden in between a row of *Pinus* sp. and *Salix* sp. along a brook which contained water only during winter. It was necessary to change the position of the trap in mid June (13.VI) since the collecting vessel became too much overshadowed. The samples were generally taken at weekly intervals.

Ottignies (mid Belgium, alt. 65 m, prov. Brabant). The trap was placed in a garden consisting of a lawn encircled by a large variety of bushes and trees (*Acer*, *Betula*, *Chaenomeles*, *Cornus*, *Crataegus*, *Fraxinus*, *Juniperus*, *Malus*, *Rosa*, *Salix*, *Sambucus*, *Syringa*, *Viburnum*). Behind the garden runs the river Dijle. Samples were taken weekly from April 1980 till the end of 1982. Data from autumn 1980 have been published by Fasotte and Grootaert (1981).

Ethe-Buzenol (high Belgium, alt. 320 m, prov. Luxembourg). The trap was placed at the border of a mixed deciduous forest along a sandy track on the top of a valley planted with young conifers. Samples were removed every fortnight.

The taxonomy is based on Chvála (1975). The material is preserved in alcohol in the collection of the « Koninklijk Belgisch Instituut voor Natuurwetenschappen ».

#### Results

##### *Sint-Martens-Latem*

The data of the captures are represented in Table I. A total number of 183 specimens belonging to 21 species were captured. Only two species, *P. pallidiventris* with 66 specimens and *P. longicornis* with 25 specimens, are dominant; *P. longicornis* occurring during spring and autumn (compare with Ottignies, Table II and III). Both species are separated in time. *P. pallidiventris* was weekly present during summer with rather steady numbers and without a pronounced peak of activity. The remaining 19 species were captured in too low numbers to draw any conclusions.

##### *Ottignies*

The study in Ottignies started already in August 1980 and ended in 1982. The results of autumn 1980 are given in Table 1 in Fasotte and Grootaert (1981) and are summarized in Table IV. During 1981, a total number of 668 *Platypalpus* specimens were captured and the data are represented in Table II. The results of 1982 are represented in Table III and it can be seen that there is a drastic drop of the numbers of *Platypalpus* (354) caught in 1982. This was probably due to the bad weather conditions during spring. However it is questioned whether this was the only reason.

In general, *Platypalpus* species appear very early in 1981. Three species are already present in mid April (18-15.IV.1981). In 1982, their activity was delayed with two weeks, probably caused by the bad weather during April and the beginning of May. The greatest activity of *Platypalpus* was in mid June with the greatest number of species and the highest diversity (15 species present). From thereon, the number fluctuated. In 1981, *Platypalpus* was found till mid November (14-21.XI.1981) while the last records in 1982 were in mid October (9-16.X.1982). In 1980, *P. maculipes* was active till the end of November when the first frost started.

Since the number of captures in 1981 is high, periods and peaks of activity are more pronounced than in the following year. Although the periods of activity are displaced in 1982, those of 1981 are confirmed. The activity of the early spring species is delayed by two weeks in 1982 but the high temperature at the



TABLE III  
Number of *Platypalpus* caught at Ortignies during 1982.

	1	8	15	22	29	5	12	19	26	3	10	17	24	31	14	21	28	3	10	18	25	2	9	16
	V	V	V	V	V	VI	VI	VI	VI	VII	VII	VII	VII	VII	VIII	VIII	VIII	IX	IX	IX	IX	X	X	X
<i>agilis</i>	1,-	-,-,1			1,-	-,-,1																		
<i>albicornis</i>																								
<i>annulipes</i>			1,-	1,-	1,-	1,-	3,2	-4	3,1	2,3	1,2	-,-,1												
<i>aristatus</i>	1,-				1,-	-,-,1																		
<i>articulatus</i>																								
<i>calceatus</i>																								
<i>coarctatus</i>																								
<i>cothurnatus</i>					1,-	3,3	3,3	1,2	3,1	1,-														
<i>deserti</i>																								
<i>interstinctus</i>																								
<i>lutei</i>																								
<i>laticinctus</i>																								
<i>leucocephalus</i>																								
<i>longicornis</i>		1,1	-,-,3	2,6	2,4	1,1																		
<i>longiseta</i>																								
<i>luteoloides</i>																								
<i>maculipes</i>																								
<i>minutus</i>																								
<i>niger</i>																								
<i>notatus</i>																								
<i>optimus</i>																								
<i>pallidicornis</i>																								
<i>pallidiventrif</i>																								
<i>pallipes</i>																								
<i>praecinctus</i>																								
<i>rapidoideus</i>																								
<i>stabilis</i>																								
<i>subnigrinus</i>																								

end May 1982 probably influenced the earlier appearance of *P. longiseta* and *P. optimus*.

The periods of activity of the most dominant species are underlined in Table II and III to show the length of the periods and the alternative activity of some species.

There are three early spring species : *P. agilis*, *P. aristatus* and *P. longicornis*, the latter also with a second peak of activity in the autumn. Their morphology is different. *P. agilis* is a stout species with a long spur on the mid tibiae, *P. longicornis* has large females but rather small males and has no spur on the mid tibiae, while *P. aristatus* is a small species with a short blunt spur on the mid tibiae. These morphological differences are probably related to their predation behaviour. *P. minutus*, another species which appears early in spring is hardly represented at Ortignies and is active in this locality only during mid summer. *P. longiseta*, the dominant species, appears at the end of May — mid June and is separated from *P. longicornis*, the second dominant species, in time and in abundance (Table II and III). When the numbers of *P. longiseta* decline near the end of August, *P. longicornis* will reach a second peak of activity during September and October.

The period of activity of *P. longiseta* is broad and relatively high numbers were caught throughout June to August. *P. longiseta* is usually found together with its sister-species *P. pallidiventrif*. The latter is found only in very low numbers, indicating that there is indeed a niche segregation between the two species.

*P. cothurnatus*, a small to medium-sized species with a blunt spur. It has a short period of activity from mid May to mid July. The peak of activity is during mid June.

*P. annulipes* appears earlier than *P. longiseta* and has also a broad period of activity with a peak in early June.

*P. maculipes*, a true autumn-species, appears erratically in August but has its peak of activity from the end of September till the end of October or November, depending on the first frost.

Periods and peaks of activity of the remaining species are less pronounced.

*Sex-ratio*

Table IV gives the sex-ratio i.e. the percentage of the number of females to the total number of adults. The sex-ratio of species



with less than 20 specimens is not given. *P. aristatus* is the only species by which much more males than females were captured (0.40). The sex-ratio is about equal in *P. agilis*, *P. annulipes* and *P. cothurnatus*. Males are rather rare in *P. dessarti*, *P. interstinctus*, *P. luteoloides*, *P. maculipes*, *P. niger*, *P. notatus*, *P. optivus* and *P. praecinctus*. However, males have always been found.

#### Ethe-Buzenol

The results are represented in Table V. A total number of 537 specimens belonging to 30 species were captured. Only two species are dominant. *P. laticinctus* appears in early May (5-19.V.1981) and has a high peak of 211 individuals in the following fortnight; it disappears already in the third fortnight (beginning of June). Its period of activity is short, males are present in low numbers and only in the beginning of the period of activity. *P. major*, a slightly stouter species than *P. laticinctus*, is the second dominant species, with a total of 98 specimens. Its peak of activity follows immediately after the peak of *P. laticinctus*. The period of occurrence is also longer than in *P. laticinctus*. Males are yet unknown in this species.

*P. pygialis* has a more or less distinct flight period from the beginning of June till the beginning of August. The remaining 27 species are represented by few specimens. Their erratic presence seems to indicate that they are not true 'deciduous forest'-species but that they are living in the nearby biotopes.

#### Discussion

The use of Malaise traps seems promising for faunistical studies. At the three different localities 50 *Platypalpus* species were captured, a figure which represents about two thirds of the actually known number of species in Belgium. In this way, many species were recorded for the first time in Belgium and a completely different picture of the species composition is obtained in contrast to the classical sweeping method.

Malaise traps are interception traps and are therefore highly dependent upon the position of the trap, the wind direction and other weather conditions. Much depends also on the behaviour

of the insects in the trap. When an insect hits the vertical wall, it should walk or fly upwards until it gets trapped in the collecting vessel. *Platypalpus*, which is mainly a leaf-running predator, hunts actively on the vertical wall of the trap.

Apart from the study of BÄHRMANN (1984) no other numerical studies on population behaviour of *Platypalpus* are available. The numerical data of the present study should not be overestimated. Longevity, vagility, behaviour of the sexes are unknown so that it is actually impossible to give a full interpretation of the peaks of activity.

A high species diversity is present at each of the three stations. At Ottignies, 30 species are found in 1981, 29 but some different species in 1982 and with those found only during the autumn of 1980, a total number of 36 species are recorded. In Sint-Martens-Latem, 21 species are found and 30 species in Ethe-Buzenol.

The adult flies are voracious predators on a wide variety of preys. It is clear that with such a high number of species occurring at a single locality, there must be a niche segregation.

A first segregation is the time of occurrence. The peaks of activity of most species do not fall together. Of the 12 well represented species in Ottignies, most of the peak activities are separated in time, especially in the two dominant species. *P. longicornis* has a first peak of activity during early spring, then it disappears and *P. longiseta* dominates during summer. At the moment that *P. longiseta* disappears, *P. longicornis* has a second peak of activity during the autumn. This is also well illustrated in Ethe-Buzenol where the peaks of activity of *P. laticinctus* and *P. major* fall close together but are separated. The overlap in the periods of occurrence are small with few individuals.

The difference in habitat or microhabitat is not shown by our sampling technique. On the other hand, BÄHRMANN (1984) with semi-quantitative sweeping, could make a distinction between species which live in the herb layer such as *P. pygialis* and *P. pallidicornis* and species which live on the bushes and trees such as *P. major*, *P. annulipes* and *P. maculipes*. In fact, the high diversity in each station is caused by numerous accidental captures. In Ethe-Buzenol only two species were well represented, while the remaining 28 species were captured in very low numbers. This seems to indicate that there is a certain vagility, important for spreading and colonization.

A third factor in the niche segregation is probably the different predation behaviour and prey preference. At Ottignies, *P. agilis*, *P. longicornis* and *P. aristatus* are early spring-species, occurring together. However, the morphology of these species is quite different. *P. agilis* is strongly built with a stout spur on the middle tibiae. The female of *P. longicornis* is generally large while the male is rather small; both without a spur on the middle tibiae. *P. aristatus* is small with a short blunt spur on the middle tibiae. These different morphological types suggest a different predation behaviour. Unfortunately such data are not yet available.

The great unknown factor in the life history of *Platypalpus* is the biology of the larvae. It could well be that their niche segregation influences the distribution and diversity of *Platypalpus* in a biotope.

Since no other studies on population behaviour of *Platypalpus* are available, the numerical data of the present study should not be overestimated. It can be seen from the tables that the periods of activity can be short, long, or that pronounced peaks of activity can be present. So far, nothing is known about longevity so that interpretation of the curves is difficult.

There are species with very short periods of activity such as *P. agilis* (Table II), *P. aristatus* (Table II), *P. laticinctus* (Table V), *P. cothurnatus* (Table II and III). These species have apparently only one generation per year. Other species have a long period of activity such as *P. longiseta* (Table II), *P. pallidiventris* (Table I) and *P. annulipes* (Table II), but it is not evident that they have two generations per year. Emergence traps could give an answer.

*P. longicornis* is the only species in the present study which has two well separated generations. One during early spring and one during autumn; separated by a period (July) during which no specimens were caught. So apparently, *P. longicornis* needs about 17 weeks for a generation cycle. Other field records show that *P. minutus* has also two generations, which are not evident in this study due to the small numbers of specimens.

As is shown by CHVÁLA (1983), the flight periods and number of generations in Empidoidea depend largely on the latitude and occasional climatic which can influence the presence of a second generation. This is seen already in the displacement of the activity of the early spring-species in Ottignies during 1981 and 1982. Such differences also occur on a smaller extent in Belgium between

the lowland (west) and the more elevated areas in the south where the climate is slightly different. Adding up the data from different years or regions results in broad periods of activity. So, it would be fruitful to determine the factors which influence emergence and activity of *Platypalpus* to come at least to reasonable predictions about its phenology.

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